Astronomy and Astrophysics 2011 vol.529

Witnessing the magnetospheric boundary at work in Vela X-1

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Abstract

We present an analysis of the Vela X-1 "off-states" based on Suzaku observations taken in June 2008. Defined as states in which the flux suddenly decreases below the instrumental sensitivity, these "off-states" have been interpreted by several authors as the onset of the "propeller regime". For the first time ever, however, we find that the source does not turn off and, although the flux drops by a factor of 20 during the three recorded "off-states", pulsations are still observed. The spectrum and the pulse profiles of the "off-states" are also presented. We discuss our findings in the framework of the "gated accretion" scenario and conclude that most likely the residual flux is due to the accretion of matter leaking through the magnetosphere by means of Kelvin-Helmholz instabilities (KHI). © 2011 ESO.

http://dx.doi.org/10.1051/0004-6361/201116482

Keywords

Pulsars: individual: Vela X-1, X-rays: binaries